INSIDE: WHY TRICOS DRIVE ME NUTS

Montana Outdoors

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JULY–AUGUST 2015

THE FRONT

Where prairie and mountain meet

IN THIS ISSUE:

KOO-CAN-USA

CATFISH FOR DOG DAYS

TOUGH LOVE IN THE TENDOYS

STRETCHING YOUR VENISON BUDGET

Montana Fish, Wildlife & Parks

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HEALTHY FOR NOW
Their appearance of strength belies bighorn sheep's vulnerability to pneumonia, which has killed hundreds in recent years. See page 26 to learn of a new approach to restoring infected herds. Photo by Donald M. Jones.

FRONT COVER
With Sawtooth Ridge as a backdrop, arrowleaf balsamroot bloom on the Sun River Wildlife Management Area portion of the Rocky Mountain Front. More about the Front on page 18. Photo by Chris McGowan.

Lions after all?

I just read the article on porcupines in the March-April issue ("Where Have All the Porcupines Gone?). I'm not sure I would dismiss the effect of mountain lion predation out of hand. In a new book on mountain lions that I am writing for Falcon Guides, I note: "Biologists have documented a young male mountain lion killing 35 porcupines in the space of 3 months in Colorado. A young female in Wyoming took 24 in 2.5 months. Cougar predation on porcupines may substantially impact local numbers. A small population of porcupines in Nevada was reduced by over 90% in three years due to mountain lion predation." Correlation certainly does not imply causation, but may suggest it. This is idle speculation on my part, but perhaps the elimination of wolves and reduction of grizzly bears during the time of mountain lion recovery (1950 to 2000) allowed cougars to rebound to levels actually higher than in the pre-homestead era.

Jack Ballard
Red Lodge

Woman versus porcupine

I was dismayed to read about the unexplained decline in porcupine numbers. Like most people, I never considered porkies to be among my favorite beasts, but the countryside is poorer without them. The article's sidebar, "Petting Not Advised," brought to mind the time I did just that. About 20 years ago, a friend and I hiked high into the Crazy Mountains along with his dog, which was known to attack any porcupine it saw. My friend wanted to try for a night under the stars, so he and the dog went off to find a good spot. I slept in the tent, and placed our four leather

Where Have All the Porcupines Gone?

In western Montana's mountains, once-numerous "quill pigs" have disappeared. Biologists have theories but, so far, no answers. By Ellen Horowitz

boots in the open doorway on either side of my feet to air out.

During the night I was jolted half-awake, and sat up. In the moonlight I could see a large, pale, puffy object draped over my ankles. I reached forward to grasp it, and my hand sank into thick, coarse fur. Very quickly I was wide awake and somehow knew that I was handling the front end of a porcupine that was chewing one of the boots. I picked up another boot and banged the animal's head until it wandered off. Then the porcupine started clattering around in the campsite. I yelled out into the darkness, and threw all the boots, one after another, hoping to drive it away.

In the morning, my friend came into camp and helped me recover all the boots, which miraculously hadn't been eaten. We agreed that it had been a lucky night: I happened to encounter a very mellow porcupine, I patted it on its quill-less end, and the dog had never been aware that his mortal enemy was just a short distance away.

Gretchen Rupp
Bozeman

Nice neighbor

Just a note to tell you how much we have enjoyed *Montana Outdoors*. My neighbor signed us up for a gift subscription, which I am renewing today. We look forward to each issue.

Andy Pullen
Montrose, IL

Best deal in Montana?

I was pleased to see that the Montana Legislature recently passed a bill creating a new resident base hunting license costing $8. I'd been concerned that, had the bill not passed, FWP would have been forced to make reductions in its successful Block Management Program. I believe that this program is the best of its kind in the country. I can't even count the number of days afield I've had for antelope, Huns, sharptails, whitetails, pheasants, and even sage-grouse. One of my favorite parts of hunting Montana's Block Management Areas is meeting the landowners, who mostly are really good folks.

I recently sent your department a donation of $60 to help the Block Management Program, along with my thanks for the hard work the department does on behalf of all Montana sportsmen and sportswomen. Block Management is a great deal for us blue-collar resident hunters, and we need to support this wonderful and successful program any way we can.

David Kirkland
Bozeman

Alan Charles, FWP coordinator of landowner/sportsmen relations, responds: I appreciate Mr. Kirkland's positive feedback and generous donation to the Block Management Program. One of the biggest challenges we face, besides funding, is balancing the many and diverse needs of a wide array of landowners and hunters. We try to keep the program flexible enough to tailor each Block Management contract to the needs of individual landowners while providing hunters with a large menu of diverse opportunities. Montana Outdoors *readers can learn more about the wide range of Block Management hunting options in the upcoming September-October issue.*

> "Block Management is a great deal for us blue-collar resident hunters, and we need to support this wonderful and successful program any way we can."

Speak your mind

We welcome all your comments, questions, and letters to the editor. We'll edit letters as needed for accuracy, style, and length.

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Grilled Pronghorn Fajitas

By Tom Dickson | Preparation time: 20 minutes | Cooking time: 25 minutes | Serves 6

INGREDIENTS

¼ c. fresh lime juice
4 cloves garlic, peeled and smashed
3 T. roughly chopped cilantro leaves
4 T. vegetable oil
2 t. Worcestershire sauce
1 T. chili powder
1 t. sugar
1 t. dried crushed oregano
1 t. red pepper flakes
1 t. ground cumin
1 t. ground coriander
2 lbs. venison loin, rump, or flank steak
½ t. salt
1 t. ground black pepper
6 large flour tortillas
3 bell peppers (red, yellow, and green), seeded, cut into ½-inch-wide strips
1 large onion, cut into 8 wedges
Lime wedges and ½ c. chopped cilantro

DIRECTIONS

In a bowl, whisk together lime juice, garlic, cilantro, 2 T. oil, Worcestershire sauce, chili powder, sugar, oregano, pepper flakes, cumin, and coriander. Pour into a large zip-lock bag, add the venison, and seal. Place in a large bowl and refrigerate 4 to 8 hours, turning occasionally. Remove the meat from the bag and pat dry. Season on both sides with salt and pepper.

Preheat the grill to high. Put the pepper and onion pieces on skewers as for kabobs. Brush with 2 T. vegetable oil. Set aside.

Grill the steak to preferred temperature, 3 to 4 minutes per side for medium rare. Remove from heat, cover loosely with foil, and let rest 10 minutes before slicing.

Meanwhile, put the skewers on the grill and cook the peppers and onions for 10 to 15 minutes, turning several times to give all sides a slight char. Remove vegetables and slice thin.

Thinly slice the steak against the grain.

Microwave the tortillas 15 seconds on high, to warm and soften.

Divide the venison among the tortillas and top with the vegetables. Top with the chopped cilantro and a squeeze of lime juice and serve immediately with a cold beverage.

Some years, we hunters bring home a lot of venison (by which I mean the meat of deer, elk, pronghorn, moose, or wild sheep). A few seasons ago, I was lucky enough to bag two white-tailed deer, a bighorn ewe, and an antelope. That year my wife and I seemed to eat nothing but grilled venison steaks as we whittled down the mountain of white packages packed into the basement freezer. Friends and colleagues who kill an elk, or an elk *and* a deer or two, tell me their family might eat venison five nights or more each week, year round.

But during some seasons, hunters might harvest only one big game animal or even none at all. Last year all I could muster was a single whitetail doe. It's times like these that we have to be much more judicious about venison consumption so we can make the meat last throughout the year.

One way to get a lot of meal out of not much meat is with fajitas. Because the bulk of the dish is grilled vegetables, all you need to add is 1 pound of steak to satisfy a hungry couple and 2 pounds for an entire family.

Fajitas are great for hot summer evenings because you can grill the meat and vegetables outside. Make the marinade the night before, then toss the meat in the mixture and refrigerate before leaving for work in the morning.

This recipe combines the best features of several different ones I've tried over the years and contains an ideal mix of spices, meat, vegetables, and tortilla. I call these "pronghorn" fajitas because the animals don't produce much meat, and you can feed a lot of people without using up too much of your precious antelope venison. But any venison will do.

—Tom Dickson is editor of Montana Outdoors.

SHUTTERSTOCK

Mostly (but not all) good news

The outcome of the 2015 Montana legislative session was generally positive for Montana Fish, Wildlife & Parks, with a few serious exceptions.

The most important bill slightly raised resident hunting and fishing license fees, which was needed because inflation has steadily increased the cost of fish and wildlife management since the last fee increase a decade ago. The legislation will allow FWP to maintain existing fish and wildlife management and conservation programs for four more years by, starting in 2016, raising the cost of a resident fishing license by $3, requiring a new base hunting license that costs $8, and standardizing the price of currently free or discounted licenses at 50 percent of what other residents pay.

Our thanks go to Representative Jeff Welborn of Dillon, who carried the bill, and to the Citizen Fish & Wildlife Licensing and Funding Advisory Council, which represented hunters, anglers, businesses, legislators, and major conservation groups. The fact that the bill passed by 80 votes in the House is testament to the council members' effectiveness—as well as the strong relationships that FWP game wardens, biologists, and others have built with landowners and sportsmen and sportswomen in communities across the state.

Other important bills that the legislature passed and were signed by Governor Steve Bullock:

- One bill denies hunting privileges to anyone convicted of shooting from roads or driving in a manner that scares wildlife off roads back onto lands where the animals can be shot.
- Another bill clarifies language for legally tagging a big game animal by replacing "immediately upon kill" with "before the carcass is removed from or the person leaves the site of the kill."
- In order to conserve sage-grouse habitat and demonstrate Montana's commitment to sage-grouse conservation to the U.S. Fish & Wildlife Service, the legislature established a Montana Sage-Grouse Oversight Team, allocated $10 million from the state general fund for grants to private landowners for sagebrush conservation, and included funding for staff to implement the Governor's Executive Order and the Sage-Grouse Stewardship Act.
- A new provision allows a youth age 10 to 17 to hunt, for two years, small and big game when accompanied by a mentor.
- A provision in the main spending bill made official a directive by the 2013 legislature that all state agencies eliminate 4 percent of their positions. For FWP, this means cutting 20.5 positions, effective July 1. These cuts will no doubt make it much harder for us to carry out the conservation and management work we are entrusted to do.
- Another disappointing piece of legislation was a provision that ends fee title land acquisitions by FWP under the Habitat Montana, Upland Bird, Migratory Bird, Bighorn Sheep Habitat, and Fishing Access Site Programs. Funding for these programs continues to flow into their accounts, though our authority to purchase land from the accounts has been removed. Fortunately, FWP can finish acquisitions already under negotiation and continue leasing land and acquiring conservation easements. Despite the fact that FWP pays property taxes and assessments ($675,000 in 2014) on acquired fishing access sites and wildlife management areas, and that these parcels are essential for fish and wildlife habitat and public access, some legislators believe that FWP owns enough land and does not need more.

END OF AN ERA? The biggest disappointment of the recent Montana legislative session is a new provision that forbids FWP from purchasing new wildlife management areas or fishing access sites.

JASON SAVAGE/MONTANA FWP

Montana's conservation community needs to be aware of this sentiment and prepare for future legislation that may seek to reduce or eliminate programs that acquire land for habitat and public access. The big question hunters, anglers, and other conservationists need to answer over the next two years is whether they value these programs and want them to continue.

—M. Jeff Hagener, Montana Fish, Wildlife & Parks Director

JEREMIE HOLLIMAN

FISH FINDER

AMBER STEED
Fisheries Biologist, Kalispell

Here I'm piloting an FWP jet boat on the Flathead River. Because jet boats don't have propellers, they allow us to navigate shallow stretches of the river and its tributaries. Our boats are both transportation vessels and tools for studying fish. For example, we attach electrodes to a boat, which acts as the "ground" or negative charge, and then drop positive-charge electrodes into the water. Fish are drawn to the electrical field and then, when they hit it, are temporarily stunned. After netting the fish, we then measure length and weight, take a fin clip to gather genetic information, or implant a radio tag so we can later track the fish by boat with a receiver. We track fish to learn about their seasonal movement patterns, spawning locations, and other habitat use.

I learned to run and trailer boats while working on lakes as a fisheries technician at Yellowstone National Park. Here in the Kalispell area, I work mostly on big rivers, which are much more challenging because of the moving water and constantly changing depths. Fortunately, I have a crew of three great technicians who can fix nearly any motor or boat problem. Their skills keep the boats out of the shop and on the water so that we can continue to do our work with as few interruptions as possible .

While climbing Glacier National Park's Mt. Cleveland in late summer, photographer **STEVEN GNAM** noticed muddy water in a small, unnamed lake several thousand feet below. Then he spotted the source of the mud—several cow elk wading through the shallow water, with a bull following several hundred yards behind. "He was staying closer to shore. I could see him struggling to walk, and I think that because he was heavier he was sinking into the mud more than the cows were," says Gnam, a longtime Whitefish resident who recently moved to Washington State. "You usually don't see many elk in Glacier because the vegetation is so thick, but once the rut starts, they seem to come out of the woodwork." Gnam says he knew the scene below him represented a once-in-a-lifetime shot. "It was like the aerial perspective you'd get from an airplane, but I was on a mountainside," he says. "From that high vantage point, I was really struck by the clean line of the shore, that expansive lake, and the bull down there positioned between them." ■

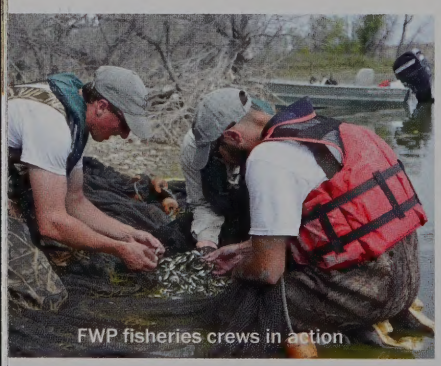
1

Number of Montana's ten snake species that are poisonous (the prairie rattlesnake).

How is FWP spending your fishing license dollars?

The best source of information on fisheries management across Montana is the *FWP Fishing Newsletter*. The annual publication highlights fisheries management activities throughout the state, including the agency's aquatic invasive species, hatchery, and fishing access site programs.

A sample of stories in the 2015 edition: Noxon Rapids Reservoir's bass fishery; Horseshoe Lake's tiger muskies; Poindexter Slough's new makeover; trout movement on the Big Hole; Madison cutthroat; Tiber's walleye output; increases in Missouri trout size; Bighorn trout numbers; the Yellowstone's 26.5-inch brown; and the lower Milk's channels cats. And that's just for starters. Find the newsletter at **fwp.mt.gov/fishing/newsletter**.



FWP fisheries crews in action

BIRD CONSERVATION

Audubon chapter declares war on burdock

As if roaming cats and habitat loss didn't make life tough enough for songbirds, along comes a new threat: burdock. The invasive plant grows Velcro-like seed heads that trap alighting birds, causing them to die of dehydration. Pet owners also despise burdock because the ball-shaped seed heads imbed themselves in a dog's coat. "Fortunately the plant is a biennial, so you can control it without chemicals by clipping off seed heads before they germinate," says Paulette Epple of the Sacajawea Audubon chapter in Bozeman.

Epple says club volunteers remove burdock from trails throughout the area. "Last year we hauled out two dozen 30-gallon bags of burrs," she says. Take part in a Bozeman-area burdock eradication day this August by contacting Epple at bigskyepples@msn.com. On your own hikes, carry a clipper to cut emerging seed heads off any burdock you see—the plant's large leaves resemble those of rhubarb. Be sure to bag and properly dispose of the clippings or they will germinate. ■

A chickadee that died after being trapped in burdock seed heads

31 Days of Openness

Governor Steve Bullock has designated July 2015 as Montana Open Land Month. "Open spaces provide for vast scenic viewing and healthy wildlife populations. They also contribute overwhelmingly to Montana's tourism, agriculture, and outdoor recreation industries," says Governor Bullock. Events include the Montana Governor's Cup Walleye Tournament at Fort Peck Reservoir (July 9–11), One Helena Hundred bike tour (July 18), Tour of the Bitterroot bike rides in Hamilton (July 19), Red Ants Pants Music Festival in White Sulphur Springs (July 23–26), and the Big Sky Fly Fishing Tournament in Big Sky (July 25–26). "Our hope is that by celebrating open land, Montanans will also recognize the importance of conserving open land," says Glenn Marx, executive director of the Montana Association of Land Trusts. For more information, visit: **openlandmt.org**.

CLOCKWISE FROM TOP LEFT: CARTOON ILLUSTRATION BY MIKE MORAN; PAULETTE EPPLE/SACAJAWEA AUDUBON; SHUTTERSTOCK; JESSE LEE VARNADO/FWP

WOLF MANAGEMENT

Wolf numbers and livestock depredations decline in 2014

It appears that Montana is finding a sustainable balance between having enough wolves for a healthy population but not too many of the large carnivores that would cause undue depredation to livestock operators.

Last year the state's verified wolf population dropped by 12 percent, while depredations by wolves continued to decrease, declining roughly 46 percent from 2013.

Overall, Montana's wolf population continues to be healthy and far above federal recovery goals, says Jeff Hagener, FWP director. "We're also heartened to see that confirmed wolf depredations on livestock again made a significant decline," he says.

The minimum number of wolves counted by FWP wildlife biologists at the end of 2014 was 554, compared to the minimum of 627 wolves counted at the end of 2013, according to the department's annual wolf conservation and management report, released in May. The minimum count is the number of wolves actually verified by FWP wolf specialists. The actual number is estimated to be 27 to 37 percent higher than the minimum count.

Confirmed livestock depredations caused by wolves included 35 cattle, six sheep, and one horse in 2014. Cattle losses were the lowest recorded in the past eight years. The decline continues a general downward trend that began in 2009, says Hagener. "It reinforces the fact that we have more tools for managing wolf populations and are applying them effectively," he says. "One of our top priorities is to minimize livestock losses, and we're continuing to make a positive impact."

The continuing decrease is likely the result of several factors, including work by FWP wolf management specialists and ranchers to install flagging, fencing, and other deterrents; targeted removal of depredating wolves in cooperation with staff of USDA Wildlife Services; and the effects of wolf harvest by hunters and trappers.

Hunters and trappers harvested 213 wolves in 2014, compared to 231 in 2013.

The total number of known wolf mortalities during 2014 was 308, down from 335 in 2013. In addition to the legal harvest, 57 wolves were removed to reduce livestock depredations (down from 75 in 2013). The remaining wolves died from other factors including vehicle collisions and illegal kills.

FWP southwest region wolf management specialist Abby Nelson with a sedated research wolf. FWP monitors radio-collared wolves to obtain population estimates each year.

The delisting of wolves in 2011 allows Montana to manage the species under state management plans, administrative rules, and laws, the same as the state manages black bears, mountain lions, and other big game species.

Find the complete 2014 wolf report at fwp.mt.gov. ■

MOISTURE CONDITIONS

Low flows forecast for summer

Montana is nowhere near as parched as California, now in its fourth consecutive year of record drought. But it appears that Montana rivers likely will be lower and warmer than usual this summer.

An abnormally warm spring melted already-sparse lower-elevation snowpack several weeks earlier than usual. And as this issue went to press in early June, snowpack at higher elevations was just 6 to 56 percent of normal. Lowest levels were in the Kootenai, lower Clark Fork, Bitterroot, Missouri, Gallatin, Madison, and Sun-Marias-Teton Basins.

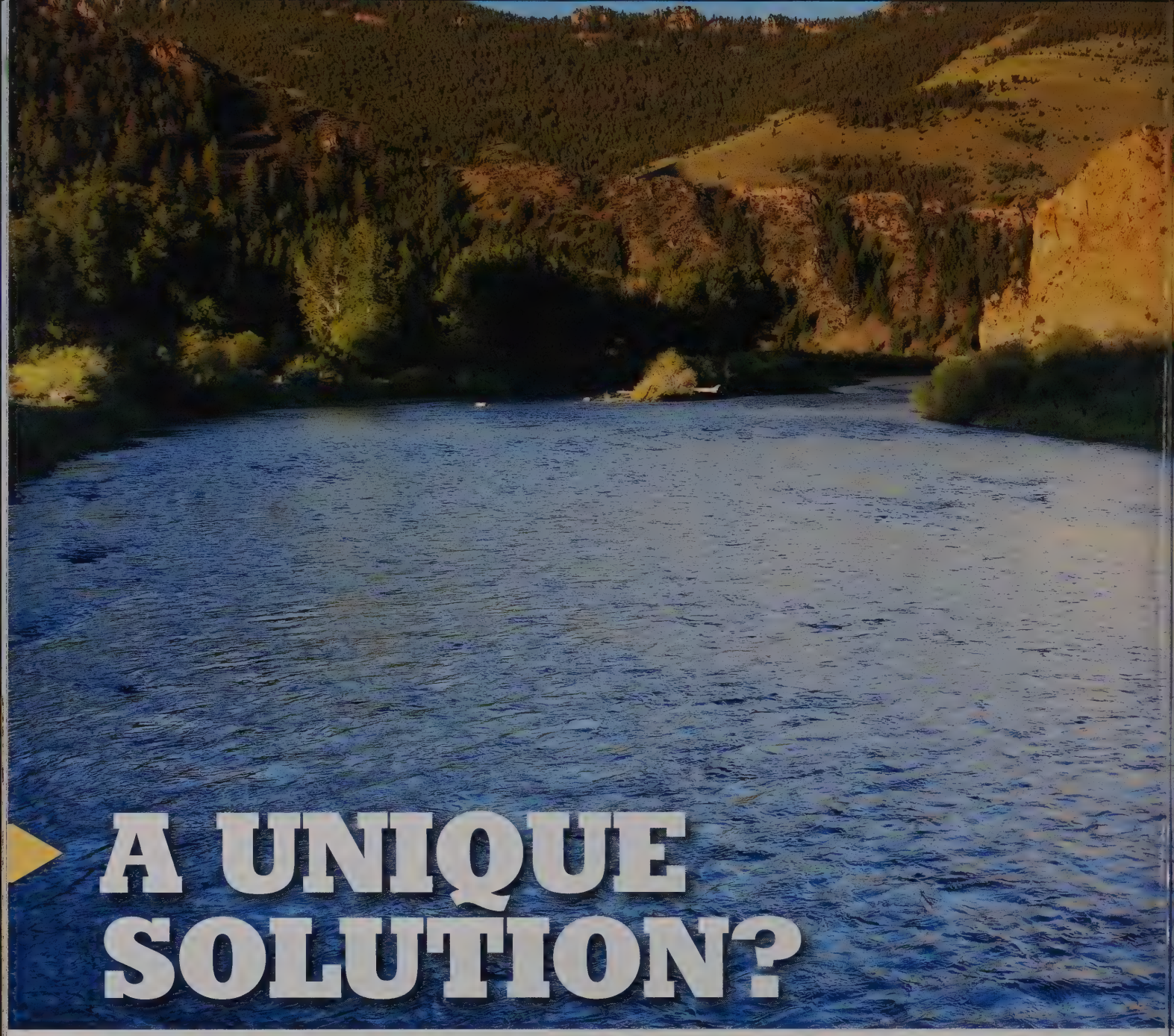
Before heading out to fish this summer, call local fly shops for stream conditions. ■

Hamilton photographer Jason Savage and his *Audubon* award-winning photo of fighting cranes

You saw it here first

A photograph of two sandhill cranes fighting at Lake Helena Wildlife Management Area, taken by Hamilton photographer Jason Savage, recently won Professional Honorable Mention in the 2015 *Audubon* Photography Awards. *Montana Outdoors* readers may recognize the image from our 2013 annual photo issue, when it was first published. Savage has posted a series of photos of the cranes leading up to his award-winning shot, along with commentary, at jasonsavagephotography.com/blog.

CLOCKWISE FROM TOP RIGHT: MONTANA FWP; JASON SAVAGE; SHUTTERSTOCK



A UNIQUE SOLUTION?

The rules governing angler floats on the Beaverhead and Big Hole Rivers seem to be working well. But are they appropriate for the growing number of Montana rivers experiencing similar user conflicts? **BY TOM DICKSON**

In 1999 the Beaverhead and Big Hole became unlike any other trout rivers in Montana. New rules regulated float fishing by outfitters and nonresidents on some stretches on certain days, giving resident anglers a section of river to fish on their own with less crowding. At the same time, the rules closed the door on any new fishing outfitters, reducing competition for existing outfitting businesses.

"[The rules] are the best thing that's happened to these rivers in my lifetime," says Steve Luebeck, a Butte resident and Trout Unlimited member who 16 years ago helped get the restrictions enacted. "The local guy can now fish without having to compete with commercial users."

Justin Hartmin, owner of Tight Line Adventures in Dillon, says that the closed stretches can inconvenience outfitters. "But we have so much water around there that if we can't fish one stretch one day because of the rules, there are still plenty of others to fish," he says. "They've allowed us to explore and learn other stretches of water and let our

ALL OURS Local anglers fish the Big Hole River's Divide-to-Melrose section, one of several stretches closed to nonresident and outfitted floating on certain days. The rules, imposed in 1999, grew out of concern that the Big Hole River and nearby Beaverhead River were being overrun by commercial operations and out-of-state anglers. The rules also benefitted existing outfitters by placing a moratorium on new operations.

clients see things they otherwise wouldn't."

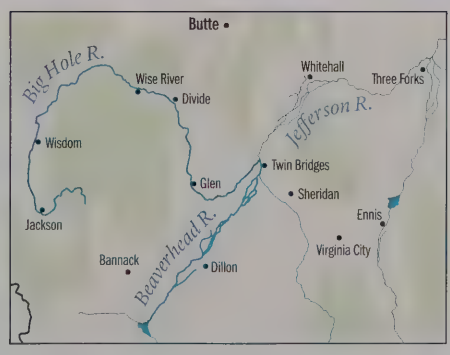
Though not all local outfitters take such a sunny approach to the restrictions, it appears that most have learned to live with the two rivers' unique access regulations. "By now everyone has accepted the rules," says Robin Cunningham, executive director of the Fishing Outfitters Association of Montana. "We still question the need to single out nonresidents, but at this point no one sees the basic rules going away."

Born out of conflict

The Beaverhead and Big Hole rules were created in response to rapidly increasing angling pressure on both rivers during the late 1990s. "Some days on the Big Hole during the salmonfly hatch you'd see a dozen boats in a single 300-yard stretch," says Luebeck.

Not everyone was convinced that a solution was necessary. Several outfitters stated publicly that the crowding problem was exaggerated.

Still, so many people thought that the number of commercial operators and out-of-state anglers needed to be curbed that in 1999 the Montana Fish, Wildlife & Parks Commission took action. The commission closed, on a rotating schedule, certain sections of the rivers to float fishing by nonresidents and outfitters. The stretches were kept open for resident and nonresident waders and resident noncommercial floaters only.



JASON SAVAGE; MAP BY LUKE DURAN/MONTANA OUTDOORS

In addition, the commission put a moratorium on new Beaverhead and Big Hole outfitters and capped the number of client days during the peak season for all existing outfitters to their "historical use."

The new rules marked the first time Montana had singled out nonresident anglers. That hit a nerve. A *Los Angeles Times* columnist wrote that Montana had "thrown up roadblocks to outsiders." Word that the state had supposedly turned its back on out-of-state anglers spread quickly. Some outfitters and motels said bookings declined during the early 2000s, though drought, recession, and the travel scare after 9/11 no doubt contributed.

Starting in 2005, the FWP Commission decided to review the rules every five years. Public support for the regulations during the review processes has been overwhelmingly positive. Based on public suggestions, the commission has modified the rules, notably to provide economic opportunities for new, smaller outfitters. All the rules will be reviewed again in fall 2015.

Most outfitters say they've learned to live with the rules, yet some are still unhappy with the restrictions. Frank Stanchfield and his wife Edith have owned Troutfitters in Wise River since 1983. "The rules were meant to reduce crowding, and that's not happening," he says. "When you close some sections to outfitters, that just makes other sections more crowded."

> "This is a public resource where anglers and outfitters have learned to each give a little for the greater good."

If visitors to the Beaverhead or Big Hole still hear some grumbling over the rules, it won't be from local anglers. Most are happy to know that a section of both rivers is set aside for Montana residents. "My son and I plan our trips for the stretches where the outfitters don't go, so we don't run into the competitive pressure and can fish in peace," says Luebeck. And most visiting out-of-state anglers have learned that only small portions of the rivers are closed to nonresident float fishing on certain days of the week, and that they can wade fish anywhere the rivers are open to residents. After a decline during the early 2000s, the percentage of nonresident angling days on both rivers has returned to late-1990s levels (roughly 60 percent for the Beaverhead and about 50 percent for the Big Hole).

Outfitters have integrated the rules into their businesses. Some even take pride in the unique solution to river crowding devised by local anglers and businesess. "I try to leave my clients with the understanding that this is a public resource where anglers and outfitters have learned to work together, to compromise, to each give a little for the greater good," Hartmin says. "Maybe they can take that back to their own state as a model for how diverse river users can learn to get along."

Tom Dickson is editor of Montana Outdoors.

STANDING ROOM ONLY The rules on the Big Hole River and on the Beaverhead River, shown here, don't restrict access for resident or out-of-state anglers who wade. Nonresidents have learned that the rules aren't nearly as restrictive for them as was once widely rumored.

LEFT TO RIGHT: JEREMIE HOLLMAN; LINDA THOMPSON

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CLEANUP CREW Dean Vollman, an FWP groundskeeper on the Blackfoot River, rows a colleague and a volunteer diver who look for bottles and other trash in the water. A new statewide policy has guided management on the Blackfoot and several other rivers in recent years.

What about elsewhere?

The Beaverhead and Big Hole aren't the only rivers where user values clash. Anglers, outfitters, floaters, and other users are trying to find solutions to crowding and other conflicts on the Bitterroot, Blackfoot, Madison, Bighorn, Missouri, and Rock Creek. On some waters, longtime anglers complain that growing numbers of kayakers and inner-tubers have squeezed them out of traditional fishing spots. On others, burgeoning use by guides, resident anglers, and nonresidents creates long waits at boat ramps. "There's a huge public desire for these issues to be addressed," says Charlie Sperry, who for ten years was the Montana Fish, Wildlife & Parks river recreation management specialist. "But it's worth noting that residents also contribute to crowding. For the most part, people don't want to restrict themselves, just someone else. And that usually means outfitters and nonresidents."

In 2002 FWP hired Sperry to help the agency look at river conflicts from a statewide perspective. The following year, a River Recreation Advisory Council representing outfitters, landowners, anglers, boaters, and legislators began discussing river issues and made recommendations to the FWP Commission. In addition to crowding, the council looked at river littering, garbage cleanup, human waste disposal, camping, vandalism, trespassing, parking, public safety, and noxious weed control.

Two years later, the commission developed a policy for establishing river rules and management plans. "The statewide policy is designed to be fair, collaborative, and consensus based," says Sperry.

It's rigorous, too. Before FWP can even consider rules or management plans on a river, the department must establish a citizen advisory council to review issues related to river use and make recommendations to the department. FWP must also collect data on river use (such as the number of launches per fishing access site and the total number of floats per day per stretch) and consider less restrictive options before placing limits on use.

> "For a lot of these river conflicts, it just gets down to common courtesy and respecting others."

In recent years, the statewide policy has guided FWP management on several high-use rivers. Using recommendations from a citizen advisory council, FWP developed a Blackfoot River recreation management plan in 2010 that identifies desired conditions for each section of the river and actions to achieve them. On the Madison, the department has surveyed outfitters, anglers, and landowners to gauge public opinion on river-related problems, set up a recreational-use permit system, and hired a ranger to manage river use.

FWP also established a Madison River advisory council that in 2013 drafted recommendations for a management plan, for which the department is preparing an environmental assessment.

In addition, FWP's Regions 2 and 3, in western and southwestern Montana, now have regional river recreation managers to help write management plans, work with citizen committees, and manage permitting.

Any more work than that, however, will have to wait. "The big issue is funding," says Bruce Rich, head of the FWP Fisheries Division. He explains that managing conflicts on additional rivers would require more staff and money than is available. "We can't ask anglers alone to pay for that work, because it also benefits outfitters, kayakers, inner-tubers, and floaters," says Rich. "So until there's a new funding source that allows a broader array of people who use rivers—residents and nonresidents alike—to help pay for managing those resources, it will be hard for us to tackle additional rivers."

In the foreseeable future, says Rich, river conflict management will likely continue at the local level. "What's happening now is that the issues are bubbling up on individual rivers and being addressed and solved locally rather than by a top-down policy from Helena," he says. "That's not necessarily a bad thing."

FWP officials regularly hear from disgruntled anglers asking the department to apply the Beaverhead and Big Hole rules to the Bitterroot, Bighorn, Madison, and other rivers. "I worry that local groups will be disappointed—either because there isn't funding to make that happen or because those particular rules aren't necessarily the best options elsewhere," says Rich.

Rich notes that solutions to river conflicts don't always require restrictions and permits. "Sometimes the issue is simply informing people about basic river etiquette and acceptable behavior," he says. "That can be done with signs and brochures without having to get into the whole complex and costly process of limiting access or use by various groups. It might sound corny, but for a lot of these conflicts, it just gets down to common courtesy and respecting others." ■

THE TROUBLE WITH TRICOS

They're too small. They're too numerous. And because trout go bonkers for the miniature mayflies, they're too hard for any fly angler to ignore. **By Tom Dickson**

My best and worst episodes of trout fishing in recent years came during Trico hatches. The best came late one mid-October morning on a channel of the Bighorn River, when my friend Rob and I caught 20 to 25 browns between us in an hour. We hadn't expected such great dry fly action so late in the year, and by the time the Trico hatch and spinner fall were done, we'd collapsed on the bank, stunned and smiling at the wonder of what had just happened.

The worst was a morning last August on the Missouri, when I stood in a channel upstream from Craig surrounded by at least 20 big rainbows rising to Trico spinners. I tried every Trico pattern in my fly box and varied every possible way to deliver those flies to the fish. After two hours in the hot late-summer sun without a single take, during which the trout never stopped feeding, I reeled in and trudged back to the parking area, a beaten man.

That Tricos can create such angling highs and lows is not surprising when you know a bit about these tiny but remarkably abundant mayflies. Their small size, great abundance, and hatches that go on for months make them one of the most anticipated and frustrating insects on Montana trout rivers.

Biology lesson

To catch trout during a Trico hatch, it's worth knowing a little biology. The Tricorythodes family of aquatic insects is a type of mayfly, related to *Baetis* (Blue-Winged Olives), Pale Morning Duns, and the others that live in Montana rivers and coat your windshield during warmer months. Like midges—which they resemble but are only slightly

KENTON ROWE

FISHLESS IN CRAIG The author flails away with no success during a Trico spinner fall on the Missouri below Holter Dam. He blames the lack of hookups that day on his gaudy attire rather than poor casting skill, faulty fly selection, or constant microdrag.

related to—Tricos live in silty river bottoms and are most abundant in slow-moving waters like below dams or in the tailouts of deep, slow pools of freestone rivers. Every major Montana trout river grows Tricos. Hatches are most prolific and long running on the Missouri below Holter Dam and the Bighorn below Yellowtail Dam. The Bitterroot, Big Hole, Clark Fork, Yellowstone, and Beaverhead also produce prodigious hatches, though not lasting as long.

Tricos hatch as early as July and as late as November, depending on river and air temperatures. Male Tricos emerge first, late at night or just before dawn, transforming from underwater nymphs into winged sexually immature adults known as duns. The insects float on the water surface like tiny sailboats for several minutes, drying their newly emerged wings before they can fly off. The males land on shore, molt again—this time into the sexually mature phase known as the spinner—and wait. Females emerge on hot mornings as early as dawn and on cooler mornings as late as noon.

After the females have molted on land into spinner form, both sexes take flight and gather in massive swarms over the river to mate. From a distance, the swarms resemble clouds of dust, often rising 50 or more feet above the water surface. After mating, the male spinners fall to the water surface in the "spent" position—wings outstretched on each side. The females fly to shore to rest for a bit before returning to the water to drop their eggs, after which they too drop dead onto the water surface.

During the spinner "fall"—which happens at about 9 a.m. in August to around noon by October—the water surface can be covered with millions of spent Trico spinners. So abundant are the mayflies that it's worth a trout's time to eat the tiny offerings. The fish set up in feeding lanes in slow current and steadily rise to the conveyor belt of food moving overhead. Trout feeding on Tricos often fall into a rhythm, rising methodically every five to ten seconds. The steady pattern likely allows the fish to use as little energy as possible.

The bigger trout often hang out near the bank, where the current is slowest. Those flat slicks are one of the hardest places to catch trout. Errors like a dragged fly or shadows caused by errant casts, elsewhere hidden by broken water or current, cause shallow-water fish to spook and dash to deeper water.

> If that happens, console yourself that at least the trout took your fly. On some days, that in itself can be considered a victory.

How to connect

When mayflies cover the water surface, a trout doesn't need to move more than a few inches to feed. That means your fly has to drift right over its nose. And if the fly isn't in the prime spot when a trout happens to be rising according to its established rhythm, the offering may be ignored. Even the best anglers sometimes make a dozen or more perfect drifts with the perfect imitation before the trout happens to rise and open its mouth at just the right moment.

Early in the morning, your best bet is to throw dun patterns (upturned wings) imitating newly emerging females. After the spinner fall, the best patterns tend to be spinner imitations, with wings extending out perpendicular to the body. Female duns and spinners have a cream or pale green body, while the male's body is black. Most spinner patterns have poly or Antron wings that help keep the fly from getting waterlogged. Oddly enough, fly shops also sell "drowned spinner" patterns that represent the insects as they sink below the surface.

Most anglers try to match the exact size of the Tricos they see on the water, which can be anywhere from a minuscule size 24 up to a relatively large (for a Trico) size 18. They reason that the trout are so focused on the Tricos floating overhead that the fish will ignore anything that deviates even by a fraction of a millimeter.

Yet other anglers swear by larger imitations, arguing that with so many similar-sized naturals on the water, it takes something different to catch a trout's attention. Another advantage of bigger patterns is that they are easier to see. Older anglers especially gravitate toward a more visible double spinner pattern or even a "cluster," which resembles several dead Tricos stuck to each other on the water surface.

I usually go big and small—a size 16 Griffith's Gnat or Parachute Adams with a size 20 Trico spinner as the second fly tied about 12 inches behind. The big fly, which trout occasionally take, gives me some sense of where the other, near-invisible fly is drifting.

Then there's Mike, an older friend of mine who fishes only a size 12 Parachute Adams on the Missouri and regularly hooks fish rising to itsy-bitsy Tricos.

Look closely at the Tricos floating past. Last September I cast fruitlessly for a half hour to several trout rising to spinners before noticing that the flies on the water were mostly females. I switched my black-bodied size 18 spinner for one with a cream abdomen and hooked a trout on my next cast (though I didn't catch another fish the rest of that morning).

Slow and stealthy

The spinner fall in late summer is usually over by midmorning, but you can still use Trico patterns well into early afternoon. Trout continue to rise to dead spinners as they float downstream for several hours after the main action upstream has finished.

Because the best Trico fishing comes on hazy sunny days, you have to be especially

CON JOBS Various Trico imitations, including duns, spinners, cripples, and nymphs.

CLOCKWISE FROM LEFT: CHUCKNGALERROBBINS.COM; MERLE ANN LOMAN; BARRY & CATHY BECK; BARRY & CATHY BECK

Tom Dickson is editor of Montana Outdoors.

THE AGONY AND THE ECSTACY Top: Spent Tricos create a trout feeding frenzy that churns the water surface. You'd think that a fly tossed into the fray would yield a strike, but that rarely occurs. Above left: Trico spinners must be regularly examined to ensure they don't become waterlogged. Above right: When presented correctly—timed perfectly, with no drag, from upstream, on ultralight tippet—the right Trico imitation occasionally fools a trout.

stealthy. Save the bright cap and shirt for the beach. Trout can see colors and will spook from gaudy attire. The best angler I know dresses pretty much the same for trout fishing as he does for bowhunting. Also, don't false cast over rising fish, which sends a shadow that often makes them quit feeding. Even if they continue sipping the surface, the fish are aware of your presence and will ignore anything that isn't a bona fide natural.

Use a long leader (12 feet) and thin tippet (3 feet of 6X) unless the wind or your casting ability requires shortening up. Many successful anglers grease their tippet with floatant up to within 6 inches of the fly. That keeps the tippet riding high on the water surface where it will be less affected by currents that cause microdrag and move the fly unnaturally.

Watch guides on the Missouri, Bighorn, and other classic Trico waters, and you'll see that they position their boats so clients can cast to risers from far upstream of the fish. The trick is to cast down and slightly across, adding an aerial upstream mend or wiggle cast to get lots of slack in the line to counteract all the complex currents on the water surface. Shake out fly line from the rod tip to help get a drag-free drift. The benefit of casting downstream to trout is that they see the fly before the tippet and leader. The disadvantage is that it's tough to get a good hook set. Too quick a set and you'll either pull the fly out of the fish's mouth or hook only its hard upper "lip," from which the hook can easily pop free. To firmly stick the corner of the jaw, pause two seconds after the take so the fish has time to turn slightly before you set the hook. Another challenge is that with 15 feet of leader and tippet plus 30-plus feet of fly line on the water, it can be tough to set the hook before a trout spits out the imitation.

If that happens, console yourself that at least the trout took your fly. During the mesmerizing-but-aggravating Trico hatch, that in itself can be considered a victory.

WHERE PRAIRIE MEETS MOUNTAIN

The origins, beauty, grandeur, and wonder of Montana's Rocky Mountain Front. By David Cronenwett

It was a long drive from Dillon that day, eight years ago. I was giddy with excitement, having just accepted a job as a naturalist with The Nature Conservancy at the organization's Pine Butte Guest Ranch, about 30 miles northwest of Choteau. I was eager to start a new life in that semi-mythical place most Montanans simply call the "Front." In a truck bulging with my life's possessions, I turned off I-15 onto U.S. Highway 287, which heads north through miles of undulating, wildlife-rich prairie. During the next hour I had momentary glimpses of huge,

Sunrise over Split Rock Lake and Castle Reef along the Rocky Mountain Front near Choteau

JOHN LAMBING

wall-like mountains far off to the northwest, and then, during the highway's long and gradual descent toward Augusta and the Sun River, I got a full and overpowering dose of the place. Before me unfolded an astonishing collision of two major continental ecosystems: western mountains that rose dramatically from the prairie, and a sea of grass falling away to the east.

I'd visited the Front before, but now that I'd be living on this landscape indefinitely, it seemed more luminous and real. Nearing Choteau, with that immensity in full view, I started to ask myself questions about what I was seeing, starting with that single word: "Front."

The term is not unique to Montana. There are mountain fronts in Utah (Wasatch Front), Colorado (the Front Range), and California (the San Gabriel Front Range). It also has no agreed-upon meaning by geologists. We're left to accept it at its awkward, face-value dictionary definition: "the side or part of an object that presents itself to view or that is normally seen first." And yet, when looking west from the edge of a high sandstone bench in Teton County, the term "Front" doesn't do justice to the overwhelming reality of the country. It quickly becomes obvious that you are in the presence of a great, complex, and unfolding story.

Many define the Front as the forested and mountainous public land west of Great Falls and U.S. Highways 89 and 287, with the southern boundary as Montana Highway 200 at roughly Rogers Pass and the northern boundary as U.S. Highway 2 around Browning. While convenient, this definition is limiting and arbitrary. Ecologists extend the Front's northern boundary well into Alberta, to about the community of Pincher Creek, and include the largely undisturbed

Clockwise from top left: cleaning a dinosaur bone at Bynum; view of the Front from Sawtooth Ridge; herding cattle; hunters riding out of Sun River Canyon

and mostly privately owned native grasslands abutting the mountains. The Front is also the drier, eastern edge of the massive 20 million-acre Crown of the Continent ecosystem, which straddles the international boundary and contains an awe-inspiring array of topography, ecotypes, and wildlife.

On the prairie rise lonely sandstone buttes and windswept benches where people centuries ago, millennia ago, climbed and gazed outward to the grass in the endless search for game. And in some special places, they looked inward in search of themselves. A visitor can sense that much has happened on this ground, a place harboring great beauty but also undeniable harshness. If you look closely, as I've tried to do, you can find in this vast and richly storied landscape the traces of many histories.

Deep time

Thirty miles west of Choteau, huge, vertical walls of slate-gray limestone glow with gold incandescence when caught by the first rays of sun. Though the spectacular sight occurs regularly, it never fails to make even local ranchers and anyone else up so early pause to take it in. What we sense is that here, as everywhere, the rocks—the bones of the earth—are the stage upon which all of the land's stories occur.

The tale of these starkly beautiful mountains takes place on a time frame inconceivable to us, beginning at the bottom of an ancient seabed 350 million years ago. A chunk of the landmass that would become North America was clustered with other supercontinents near the equator. The bodies of corals, bivalves, and other creatures with calcium-based shells accumulated on the ocean floor for thousands of millennia, forming, under pressure from the oceans,

CLOCKWISE FROM TOP LEFT: ELIZABETH MOORE; ERIC HEIDLE; STEVEN GNAM; DICK WALKER

Sunlight on Ear Mountain near Choteau

great masses of limestone. The eventual slow-motion, multimillion-year collision of the Pacific and North American tectonic plates folded and fractured huge bodies of this rock (called the Madison Formation), ultimately heaving its broken slabs thousands of feet skyward. Though the Front has eroded over the ages, an aerial or mountaintop view clearly shows these impressive north-south trending "thrust-faults." When seen from the prairie, the formations look like a massive tidal wave of stone.

About 100 million years ago, during the more recent Cretaceous Period, a shallow seaway flooded the interior of North America with the Rocky Mountains forming its western shoreline. Great beasts like the duck-billed maiasaura and triceratops still roamed the earth. Much of the geology of the plains and foothills was laid down during this period, as rivers eroded fine-grained particles from the ancestral Rockies, depositing them eastward where, through a process similar to cementation, sediments transformed into the sandstone and shales found there today.

The Pleistocene glacial events beginning about two million years ago also helped define the Front as we know it. Sheets of mountain ice advanced and retreated multiple times over this period. Under their own weight, some of these glaciers pushed slowly eastward, bulldozing rock, carving smooth-walled canyons, and eventually establishing present-day stream and river channels across the range. In the Teton drainage, glacial moraines and evidence of intense flooding are easy to find. Glacial activity created unique topography and

David Cronenwett is a writer and outdoor educator in Helena.

CHUCK HANEY

Snow geese over Freezeout Lake, with Sawtooth Ridge in the background

hydrology here. As the Teton River travels downstream from the mountains, some of its water naturally percolates through porous glacial soils, eventually rising upward as it encounters more-dense sandstone. One result is Pine Butte fen, a lush, spring-fed wetland in the middle of a dry prairie environment about 20 miles due west of Choteau. This feature, the biggest of its kind in the western United States, supports extensive groves of aspen and willow along with dozens of ponds. Moose, grizzly bears, and other wildlife are drawn to the verdant oasis and its diverse vegetation. Rare and delicate orchids grow in the moist soils, while the prairie landscape immediately surrounding the fen supports a mix of grasses, wildflowers, and sages.

Narrow ecotone

Up one of the local canyons, amid tall spruce and cottonwoods, there's a slight pullout off the gravel road. The trail up to the ridge begins there and is barely noticeable if you don't know where to look. It winds upward through stands of aspen and fir, breaking out into lush meadows and then, farther up, dead-ends at an exposed 500-foot cliff. Almost every week during the summer, I'd bring excited tourists here to that beautiful limestone outcrop. Surrounded by the fossils of ancient corals and breathtakingly blue forget-me-nots, we'd sit and take in an incredible 360-degree view of mountain, canyon, and prairie.

The abruptness of this landscape is startling to those unaccustomed to it. Because of the sudden convergence of mountain and grassland, the Front is a thin, but very long, mixing zone (or "ecotone") of plant and animal species. Approached from the east, wide-open mixed-grass prairie transitions

Clockwise from top left: cinnamon-colored black bear; long-billed curlew; pronghorn; Missouri iris

CLOCKWISE FROM TOP LEFT: STEVEN GNAM; JASON SAVAGE; JASON SAVAGE; CHRIS MCGOWAN

quickly to a Serengeti-like limber pine savanna with slight gains in elevation and changes in geology. Continuing west, you enter the montane, or mountain, habitat, with its gorgeous wildflower meadows and expansive aspen clones interspersed with forest dominated by Douglas fir. All of this happens rapidly. The distance from prairie foothills to the iconic 8,500-foot summit of Ear Mountain is roughly 5 linear miles and covers life zones from grassland to alpine. There are other places in Montana where species mingle in this way, but none are so enormous in scale or as ecologically complete, where the flow of wildlife across the land remains largely unimpeded. From that precipitous limestone cliff where I guided visitors, it can all be seen at once.

Conservation legacy

Many events and circumstances converged to make this place what it is. Elemental forces such as frequent gale-force winds, scorching summers, and brutal winters have helped keep the human population relatively low for a long time. Unlike the Canadian side of the border, which contains dozens of towns and abundant energy development, Montana's portion of the Front looks much as it did 200 years ago. The Lewis and Clarke Forest Reserve (now the Lewis and Clark National Forest, which encompasses the upper elevations of the Front) was established by the federal government in 1897 to protect water supplies, wildlife habitat, and timberland. In 1913, the state of Montana established the Sun River Game Preserve (now the Sun River Wildlife Management Area) to preserve habitat for deer, bighorn sheep, and elk populations decimated by overhunting. A handful of visionaries knew that if

Montana's big game herds were to recover, it would begin here, amid pristine mountains, forests, and grass. And what a success story it has been. Through careful management (and with tolerance and compromise among many stakeholders), the Front is now considered one of the best hunting and wildlife viewing areas in the United States.

The landscape today is a mosaic of large private ranches mixed within state, federal, and tribal holdings. Its grasslands, some of the richest but most threatened habitat on the continent, are largely intact. Because most big marketable trees in Montana grow on the wetter west side of the Continental Divide, relatively little industrial logging or road building has taken place along the Front. The place also defies simple ideas of conservation and wildness by remaining a working landscape. Local ranches, many of them generations old, support families while providing critical habitat for grizzly bears, elk, and long-billed curlews. Guest ranches, hunting outfitters, backcountry guides, and other outdoors businesses that have existed for decades draw visitors from across the globe. In a world where conflicts rage over natural resources allocation, it is heartening to know that a place exists where people have found a way to conserve both natural systems and human livelihoods.

Sacred geography

While hunting whitetails in the Teton drainage last fall, I explored a few sections of unfamiliar state land and stumbled upon a long row of sunken, lichen-covered stones on a north-south axis. I quickly recognized it as the work of ancient human hands, but could not fathom the purpose. Rocks that indicate human settlement and use extend up and down the Front, including tipi rings,

Northern lights over the Front

alignments that point toward vision quest sites, buffalo drive lanes, "stickman" figures, and more. It's easy to imagine early peoples drifting into this country along the Old North Trail, part of a prehistoric migration route that followed the ice-free corridor out of today's Siberia and Alaska, running along the east face of the Rockies from the Arctic to Mexico. Those people and their descendants lived and died here for at least 14,000 years, and evidence of their presence is scattered all over.

For them the Front was a world of useful features such as buffalo jumps and sacred sites like Chief Mountain. In a way, not much has changed since then. This vast sweep of land is still used by people to make a living, but it is also recognized for its greater value to our culture, as shown by the extraordinary efforts to conserve its water, wildlife, mountains, and grasslands. Though residential subdivision, invasive plants, and energy development continue to threaten the Front, the momentum to keep the place more or less the way it has always been appears inextinguishable.

There are places in Montana where past, present, heaven, and earth seem unified. For me, the Front is one of them. Life events required that I move to Helena last year, and on my final evening drive as a resident of Choteau, I stopped by the side of the road near a friend's ranch. The sunset bathed the country in its warm, low-angle light. As a grizzly grazed near a herd of cattle that seemed unbothered by its presence, I found myself thinking about the many stories of the Front, and how my own, like all the others, will eventually be woven into and consumed by this place. The bear disappeared into the aspens, and I drove off, leaving another story behind.

JEFF VAN TINE

VULNERABLE A healthy herd of bighorn sheep can quickly collapse when exposed to the pathogens that cause pneumonia. Infected wild sheep, like the one at right, too often weaken and die.

Cleaning the Slate

Why FWP wants hunters to cull an entire herd of bighorn sheep in the Tendoy Mountains southwest of Dillon

By Tom Dickson

Within just 48 hours of exposure to the pathogens that cause pneumonia, most bighorn sheep respond the same way people do. Their nose begins to drip. Breathing becomes difficult. They develop a hacking cough. Soon the animals become feverish and lethargic.

But unlike humans, who generally survive pneumonia thanks to antibiotics, wild sheep often die. As the infection deepens in the animals' lungs, oxygen has trouble reaching the bloodstream and the sheep weaken. Rams struggle to hold their heads up, weighted down by heavy horns. Eventually, up to 90 percent of wild sheep in a herd can collapse and die.

Such a grim scenario occurs regularly in many parts of the species' range in Montana and across the West. One such location is the Tendoy Mountains southwest of Dillon. There, a herd that numbered more than 150 sheep in the 1990s has struggled to stay above just a few dozen animals in recent years. "There aren't many options with these herds that have systemic disease problems," says Brian Solan, president of the Montana Wild Sheep Foundation. "You can keep augmenting the herd with new sheep, as we've done in the Tendoys, but the new ones just get sick and die. The sensible option is to cull all the animals in a herd and start over."

Montana Fish, Wildlife & Parks plans to do just that this September using a new procedure. The department will allow hunters to kill the remaining 30 to 40 wild sheep in Bighorn Sheep Hunting District 315 in the state's far southwestern corner. Afterward FWP biologists will stock the area with bighorns trapped from strongholds elsewhere in the state. "We've run out of alternatives," says Craig Fager, FWP wildlife biologist in Dillon. "If we do nothing, we won't have any wild sheep left in the Tendoys."

DANGEROUS LIAISONS

It's generally accepted that domestic sheep carry pathogens that can cause pneumonia in wild sheep. "Though domestic sheep seem to have acquired resistance to the effects of the pathogens, bighorn sheep have not evolved with the pathogens and often develop pneumonia when infected," says Jennifer Ramsey, FWP wildlife veterinarian in Bozeman. Ramsey says the disease can either kill sheep outright or make them too weak to escape predators or survive winter. Bighorns in an infected herd that don't become sick can still pass the bacteria to vulnerable sheep through close contact, common among the highly sociable animals.

The solution? Keep wild sheep and domestic sheep far apart. Bighorn sheep managers across the West consider 14 miles the minimum distance needed between tame and wild herds to prevent mingling. That's because some bighorns, particularly young males, have a natural wanderlust that takes them close to domestic sheep. After mixing with the livestock, young males sometimes return to their home herd carrying the pneumonia-causing pathogens like a bighorn version of Typhoid Mary.

Increasingly, FWP biologists have culled roaming young male bighorns and have even issued permits to woolgrowers to do the same. "We hate to kill young rams, because many would be the trophy rams of the future," says John Vore, Game Management Bureau chief for the FWP Wildlife Division. "But if those bighorn sheep bring disease back to the herd, we could lose

LEFT TO RIGHT: DONALD M. JONES; GAIL MOSER

dozens if not hundreds of animals."

Many large sheep producers work with FWP wildlife biologists and conservation groups to keep wild and domestic sheep apart—with guard dogs, herders, fencing, and other measures. Still, problems persist. Of growing concern is the increasing number of ranchettes and hobby farms with sheep or goats. "Most people are unaware of the problem," says Vore. "But anyone with even a few domestic sheep within 14 miles of a bighorn herd, even if it's a 4-H project, should know they are putting wild sheep at risk. Something as simple as keeping a small flock in a fenced paddock would help a lot."

In some cases, just a few wild sheep in an infected herd will perish. But in others, pneumonia outbreaks can be catastrophic. In 2010, a total of 640 bighorns died in the East Fork Bitterroot, Bonner, Upper and Lower Rock Creek, and Anaconda herds. In one northwestern Montana herd, more than 90 sheep have died within the past two years, leaving only 18. Earlier this year in a herd near Gardiner, 34 sheep were lost to pneumonia.

Particularly susceptible are lambs. Bighorns that survive an outbreak may still carry pathogens that can be passed on to the herd's young. "Even if a ewe is immune, as soon as her lamb stops drinking her milk with the antibodies in there, it becomes vulnerable," says Vore. "And without lambs, the population just peters out."

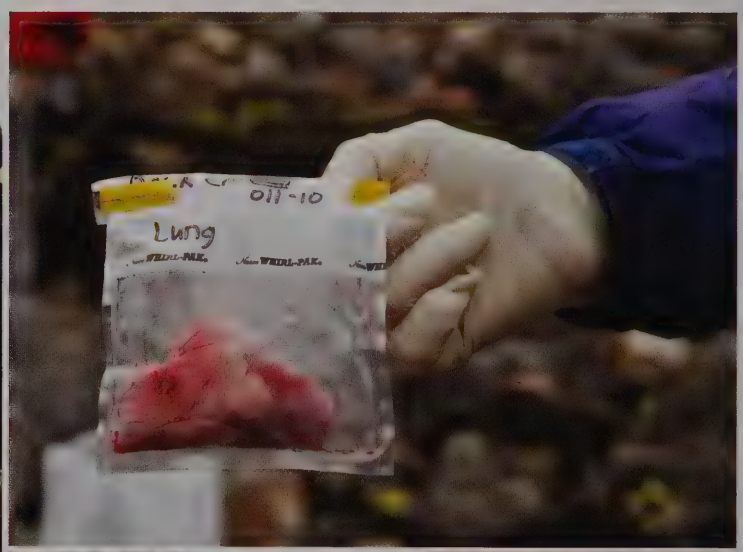
Ramsey says that no effective pneumonia vaccine, treatment, or antibiotic for wild sheep has been found.

Since the early 1990s, the Tendoys' bighorn herd is among those seeing regular dieoffs. "We don't know for sure why, but we strongly suspect pneumonia," says Fager. Biologists often can't verify the cause of death because carcasses are so quickly consumed by scavengers, he explains.

As has been the case in other struggling herds, augmenting the Tendoys population with new bighorns from elsewhere in Montana—expensive and labor-intensive operations—hasn't helped. Though the pathogens don't live long in the environment, the new animals contract pneumonia from the remaining bighorns and often die. "Once the disease becomes endemic in a herd, the herd struggles to recover, no matter how many new sheep you add," says Fager. "We've augmented this herd three times over the past two decades with 98 sheep, and it's still struggling. To keep repeating that with poor results is not only foolish but a waste of hunter license dollars."

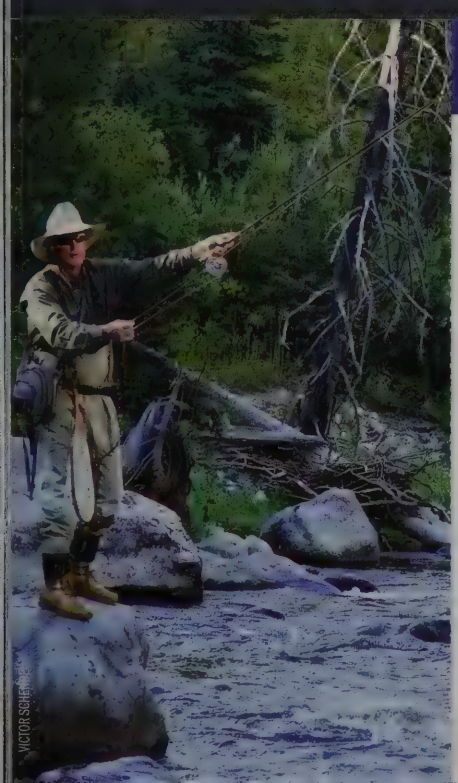
Starting this August, FWP will sell over-the-counter licenses allowing hunters to

Tom Dickson is editor of Montana Outdoors.



BAD NEWS Far left: FWP biologists examine a bighorn ewe whose lack of muscle indicates she succumbed to disease. Top: Lung samples from the sheep were sent to a lab to determine cause of death. Too often, the fatalities are due to pathogens, contracted from domestic sheep, that cause pneumonia. Left: When the pathogens linger in a herd, newly stocked bighorns are put at risk.

CLOCKWISE FROM FAR LEFT: PAUL N. QUENEAU; PAUL N. QUENEAU; TERRY LONNER/MONTANA FWP



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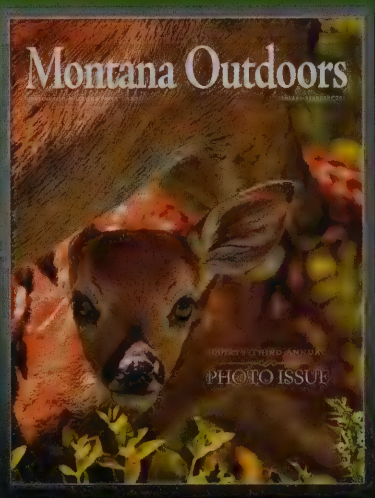

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HEAD DISEASE EXPERT FWP wildlife veterinarian Jennifer Ramsey cuts open the skull of a bighorn ram to check for infection, indicating the possibility of pneumonia. Ramsey says no effective pneumonia vaccine, treatment, or antibiotic for wild sheep has yet been developed.

> "Bighorn sheep have not evolved with the pathogens and often develop pneumonia when infected."

take a wild sheep in the hunting district. "It's a tough place to hunt, but a lot of deer and elk hunters hunt that area. If they have a sheep tag in their pocket, they'll have the option of taking a bighorn and helping with the herd reduction," says Vore.

Solan, the Montana Wild Sheep Foundation president, acknowledges that the herd cull would be quicker if FWP used aerial gunners. "But this way public hunters have a chance to go in and harvest a sheep and it won't cost the department as much," he says.

Afterward, FWP will conduct aerial surveys to be sure that every sheep has been culled. "Only when we're positive that the herd has been totally depopulated will we proceed with bringing in new sheep," says Vore.

The objective of this tough-love approach is to create a healthy, productive, and self-sustaining bighorn sheep population. Vore suspects it may take at least two years of aggressive harvest to remove all the sheep.

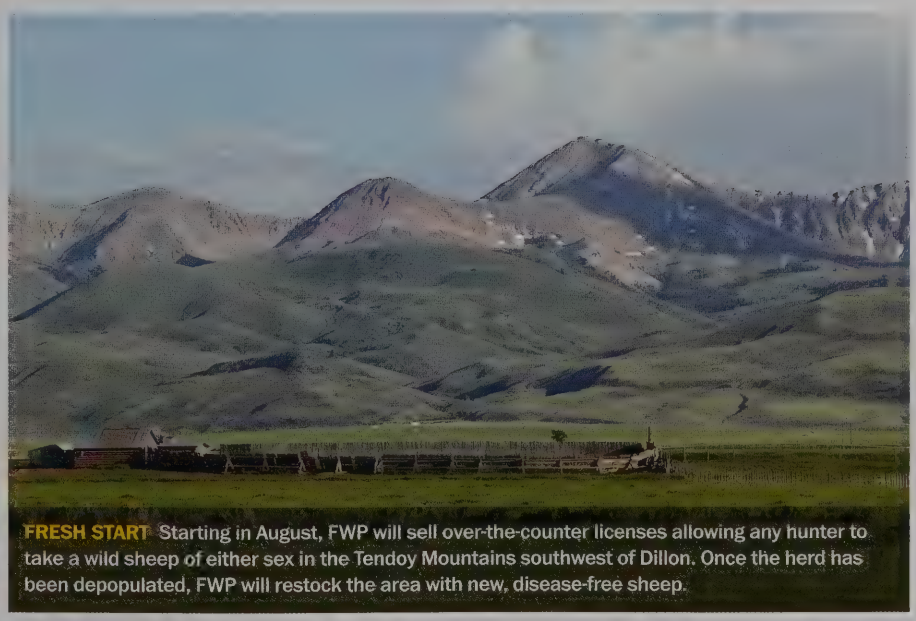
TRIED IN OTHER STATES

State conservation agencies elsewhere in the West have culled entire infected herds. In 2012 the Nevada Department of Wildlife (NDW) used aerial net-gunning to capture, for lethal removal, the remaining 15 sheep of a herd that had grown to 200 animals just three years earlier but had been decimated by pneumonia. Mike Cox, NDW big game biologist, says the agency restocked the area with 20 sheep, which so far show no sign of disease.

In 2014, after years of trying to treat a herd for multiple diseases with no success, Colorado Parks and Wildlife biologists removed the remaining 13 sheep and restocked the area with 15 new ones. "It's still too early to tell how well this is working," says Brian Dreher, the agency's senior wildlife biologist.

Some critics of the Montana plan point out that domestic sheep in the area could infect the new bighorn herd. Yet according to the recently approved environmental assessment that FWP prepared for the project, domestic sheep numbers have declined significantly in recent decades. Fager says he works closely with the few remaining owners of sheep and goats to keep their animals separate from bighorns.

Besides, he adds, the alternative to the proposed project is for bighorns to disappear entirely from the Tendoys. "If we do nothing, that herd will just sputter out and we won't have any sheep left," he says. "There are certain realities when it comes to disease that we can't ignore, and we need to do something different."



FRESH START Starting in August, FWP will sell over-the-counter licenses allowing any hunter to take a wild sheep of either sex in the Tendoy Mountains southwest of Dillon. Once the herd has been depopulated, FWP will restock the area with new, disease-free sheep.

ABOVE: THOMAS LEE; RIGHT: STEVEN MARE

STRADDLING THE BORDER

The ongoing challenge of managing Lake Koocanusa—a scenic, 90-mile-long reservoir that sits in both the United States and Canada

BY BEN ROMANS

Lake Koocanusa, a huge and remote reservoir in the state's northwestern corner, is one of the few places in Montana where fly-anglers catch rainbow trout over 10 pounds.

But leave your waders and drift boat at home. This is not your usual fly-fishing water.

From motorboats, Koocanusa anglers troll large bucktail and bear hair streamers that imitate wounded baitfish or juvenile kokanee salmon. The flies twitch and dart just beneath the water surface behind planer boards, which take the streamers 200 yards out from either side of the craft. Crankbaits such as Rapalas work well, too.

"We pick up some really big rainbows up to 12 pounds in the fall," says Bob Orsua, who has been operating Mo Fisch Charters on Koocanusa for the last ten years. "On average, we're catching 3- to 5-pound trout. At that size, when a rainbow hits, it's pretty violent. A strong fish can peel off 300 feet of line in no time."

If you've never heard of Koocanusa's rainbows—much less its big bull trout and small-but-abundant kokanee—you're not alone. Though one of the largest reservoirs in Montana, Koocanusa is known mainly to locals and Canadians who flock to its clear waters and scenic shorelines in spring, summer, and fall.

Even if you don't fish, Koocanusa is well worth a visit. The clean, turquoise water, sandstone cliffs, and surrounding mountains make it as pretty as any lake in the state. The 90-mile-long impoundment, 50 miles of it in Montana, is ringed by national forest right up to its shoreline. A highway runs its entire length, offering abundant access to picnic, swim, or take a nap.

In a region best known for forests, mountains, and unspoiled nature, Koocanusa is an anomaly. It provides a scenic expanse of water stretching as far as the eye can see, and some great big-water fishing to boot. It is also a totally artificial construct that transformed—for both good and bad—the land underneath its waters and the river downstream.

JOHN RUTH

CARIBBEAN OF THE NORTH A clifftop beach overlooks Lake Koocanusa near Eureka. The remote northwestern Montana reservoir offers miles of secluded campsites and picnic spots, all with stunning views of Koocanusa's turquoise waters and surrounding mountains.

The Ktunaxa

To fully appreciate Lake Koocanusa (technically a reservoir) requires some history of the river it impounds. The Kootenai begins as a trickle deep in the mountains of British Columbia, eventually growing into the second-largest tributary to the Columbia River. The river drops 7,000 feet in elevation over 481 miles as it makes a horseshoe-shaped route south through eastern British Columbia and northwestern Montana, northwest across the tip of Idaho's Panhandle, and then into Canada's Kootenay Lake before eventually joining the Columbia River.

The people native to this isolated river basin are the Ktunaxa. The term "Kootenai" (used in the United States and spelled Kootenay in Canada) is an anglicization of the word the Blackfeet Indians used to refer to the Ktunaxa. The Ktunaxa fished and hunted the region for hundreds of years, periodically venturing east over the Continental Divide to hunt bison.

Europeans encountering the tribe in the early 20th century described a full and rich culture. The Ktunaxa fished using woven traps and bone hooks, traveled on rivers in canoes of hollowed tree trunks, and hunted bear, deer, woodland caribou, and waterfowl. The Montana band of the Ktunaxa is today part of the Confederated Salish and Kootenai Tribes of the Flathead Nation.

Not long after Lewis and Clark completed their expedition to the Pacific and back, Canadian explorer David Thompson established several trading posts throughout the area. Eventually, westward expansion enveloped the river basin. After prospectors discovered gold, silver, and galena, fortune seekers appeared on steamboats and railroad cars, followed by loggers and settlers. Since then, copper and silver have replaced gold and coal as the basin's principal resources. As economies shift to tourism-based markets, officials on both sides of the border are keeping a close eye on the mining industry's effects on water quality (see "The Selenium Issue," page 34).

Though mining has affected the Kootenai for more than a century, it was the construction of Libby Dam, a 422-foot-tall, 3,055-foot-long concrete wall, that transformed the river into a massive reservoir and completely altered the river's fishery.

Ben Romans, of Boise, Idaho, is editor of American Angler *and author of* Montana's Best Fly Fishing.

A reservoir out of nowhere

Libby Dam was built partially in response to a tragedy two decades earlier and more than 400 miles away. In 1948, a section of a dike holding back the Columbia River broke, sending torrents of water downstream that wiped out the small community of Vanport, Oregon, and killed 15 people. To prevent future tragedies in the Columbia River Basin, and also to meet growing needs for hydropower, the United States and Canada signed the Columbia River Treaty in 1961. Three dams were built in Canada. Construction on the fourth, Libby Dam, began in 1966 and was completed in 1972.

Nearly half of the newly created Lake Koocanusa—a name combining the first three letters of Kootenai, Canada, and USA—extended across the northern U.S. border into Canada. In exchange for the United States not having to compensate British Columbia for submerging land and displacing residents, the treaty said that Canada would not have to pay for power it would receive from the dam.

Montana Fish, Wildlife & Parks began managing the fishery of the newly formed reservoir as soon as the dam was completed. According to Mike Hensler, FWP fisheries biologist in Libby, biologists tried stocking westslope cutthroat to complement the Kootenai River's rainbow fishery, which exploded immediately after the dam filled. "But we had no luck at all, even after trying all kinds of stocking combinations—from fry to fingerlings to one- and even two-year-old fish," he says.

HORSESHOE ROUTE From its origin in eastern British Columbia, the Kootenai flows south into Montana, then across the Idaho Panhandle up into Kootenay Lake before meeting with the Columbia River just north of the Washington border.

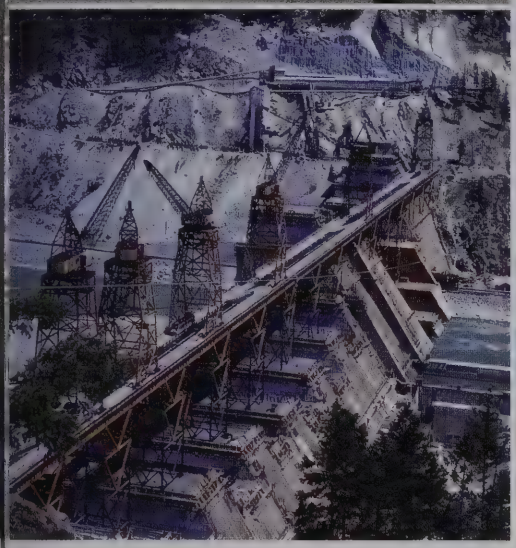
A BASIN IN FLUX Above: The original people of the Kootenai Basin were the Ktunaxa, later called Kootenai (spelled Kootenay in Canada). Below: Overharvest, pollution, and habitat loss helped drive the basin's massive white sturgeon to near extinction. Top right: A devastating flood in Oregon in 1948 spurred development of Libby Dam (below right), completed in 1972. Far right: Looking south from Lake Koocanusa, the reservoir that the dam created.

Newcomers arrive

While FWP was experimenting with cutthroat stocking, their counterparts north of the border were inadvertently sending new, non-native salmonids into the lake. The Kootenay Trout Hatchery is a British Columbia facility that was built in 1965 on what a few years later would become Lake Koocanusa's northeastern shore. The hatchery reared, among other species, kokanee, a landlocked sockeye salmon native to inland British Columbia that was stocked in the province's southern tributaries and lakes. During the 1970s, while trying to figure out why some of their kokanee were dying after hatching, the hatchery flushed large numbers of the fish, thought to be dead, into Lake Koocanusa. It turned out that some were very much alive.

While doing annual survey netting, FWP biologists spotted the first kokanee adults in the reservoir in 1979. The species thrived in

TOP TO BOTTOM: EDWARD S. CURTIS PUBLIC DOMAIN; TRAIL HISTORICAL SOCIETY; MAP BY LUKE DURAN/*MONTANA OUTDOORS*



Koocanusa, still enriched by the nutrient burst following inundation. "We don't know why the cutthroat didn't do well, but the kokanee feed mostly on zooplankton, and that food source was hugely abundant for a number of years," says Jim Dunnigan, FWP fisheries biologist in Libby. Anglers caught abundant 12- and 13-inch kokanee up until about 2000. Since then, the average size has declined to about 9 to 11 inches. "Basically the overall productivity of the reservoir started to taper off, and so there has been less zooplankton available for kokanee and the dozen or so other fish species there, and that can lead to smaller fish," says Dunnigan.

The biologist notes that just a few inches of kokanee can make a big difference to anglers. "They generally keep kokanee 10 inches and longer, and when they reach a foot or more, that's considered a respectable fish. A 13-incher weighs about twice what a 9-incher weighs," Dunnigan says.

Anglers are allowed a liberal limit of 50 kokanee per day. "You don't catch big kokanee, but you can take home lots of small ones," Dunnigan says.

Rainbows and bulls

Rich in fat, kokanee are considered an excellent food fish. In summer, barbecue grills throughout the area sizzle with grilled salmon. Also enjoying the fish are the reservoir's native bull trout and stocked Gerrard-strain rainbow trout. A unique strain native to British Columbia's Kootenay Lake, the Gerrard rainbow evolved to feed on kokanee, making Koocanusa prime habitat. FWP stocks roughly 30,000 fin-clipped Gerrard rainbows each year. Dunnigan notes that the bigger 3- to 5-pound rainbows that anglers catch, along with the occasional 10-plus-pounders, are mostly wild rainbows that have created a self-sustaining population in the reservoir.

During the past decade, kokanee have also boosted numbers of federally endangered bull trout. In 1994 biologists counted just 104 bull trout spawning redds in British Columbia's Wigwam River, the reservoir's main spawning tributary. By 2003, redd numbers had grown to more than 2,000. Encouraged by the increase, FWP successfully petitioned the U.S. Fish & Wildlife Service for Montana to allow some bull trout harvest on the reservoir's U.S. half. In 2004, FWP began allowing a limit of two bull trout per person per year. Anglers were required to obtain a free "catch card"—on which they recorded vital information about bull trout they harvested—and then send the card to FWP.

The bull trout boom was short lived. After peaking at around 2,300 in 2006, Wigwam River redd counts quickly began to decline. By 2010, biologists could find only about 1,100. In response, FWP made bull trout catch-and-release only.

What accounted for the population fluctuations? One factor may have been post-release mortality of the estimated 15,000 bull trout caught and released between 2004 and 2011. "Even if just 10 percent of

Quite a combo

The name Koocanusa—from the first letters of Kootenai, Canada, and USA—was created by Alice Beers of Rexford, Montana, in response to a contest to name the new reservoir. With the damming of the river, the original site of Rexford was flooded, and the town was moved to its current location, approximately 10 miles west of Eureka.

CLOCKWISE FROM TOP LEFT: WIKIPEDIA; LINDA LANTZY; BONNEVILLE POWER ADMINISTRATION

LINCHPIN Left: Kokanee, a small salmon native to British Columbia, shown spawning in a tributary to Lake Koocanusa. The oil-rich species not only creates a popular sport fishery (above), it also feeds the reservoir's large rainbows and bull trout.

released fish died—from deep hooking, bleeding, and handling—it adds up to a lot of fish," says Hensler. Yet another factor, says Dunnigan, "could be that the population overshot the Wigwam River's juvenile bull trout rearing capacity. There wasn't enough room for that many young trout, so numbers declined." What's more, for years British Columbia allowed liberal bull trout limits on the Kootenay River and its half of Lake Koocanusa.

Because redd counts in the past few years have risen and then leveled off at around 1,400, FWP is considering allowing some bull trout harvest on the Montana side starting next year. Biologists on both sides of the border are working to make harvest regulations throughout the reservoir similar.

Dunnigan notes that if not for kokanee, the reservoir's bull trout and rainbow numbers would be much lower. "We can't emphasize enough how important the kokanee have been to those fisheries—not to mention the kokanee fishery itself," he says. "Koocanusa had just over 30,000 angler-days in 2013, the most recent angler survey we've done. Most of that was anglers targeting kokanee, and the rest was anglers catching rainbows or bull trout that feed on kokanee. That single species is the linchpin of the reservoir's entire sport fishery."

Enjoying the lake

Anglers aren't the only ones enjoying Lake Koocanusa's clean, sparkling blue-green water and surrounding Salish and Purcell Mountains of the Kootenai National Forest. The reservoir provides miles of secluded beaches and picnic spots, accessed on the west shore via a winding paved road and on the east shore by Montana Highway 37, otherwise known as the Lake Koocanusa Scenic Byway.

Ten miles southwest of Rexford, Lake Koocanusa Bridge spans the reservoir, providing access to both shorelines. The bridge is part of the Pacific Northwest National Scenic Trail—a 1,200-mile hiking route connecting Washington's Olympic Peninsula with Montana's Continental Divide.

Visitors will find a half-dozen U.S. Forest Service campgrounds and picnic areas scattered up and down the reservoir's Montana half, as well as several private campgrounds and marinas.

Randy Burch, co-owner of Lake Koocanusa Resort and Marina, near Libby Dam, says visitation has grown in recent years. "I've already got people calling for 2016," he says. "Probably 60 percent of our business comes from Alberta." Though the increased use can create crowded conditions, Burch says that Koocanusa is so big it's not hard to find solitude: "My marina is crazy busy during the summer, but if you boat only a mile or so away, you'll feel like you have the lake to yourself."

CLOCKWISE FROM BOTTOM LEFT: USFW; STEVEN GNAM; RANDIE BURCH; CHUCK HANEY

Teck Coal open-pit coal mine at Sparwood, British Columbia

THE SELENIUM ISSUE

Though tourism has largely replaced mining and logging as an economic staple in northwestern Montana, both extractive industries are still booming in British Columbia, especially near the Kootenai River's headwaters. The Elk River watershed alone is home to five open-pit mines, owned and operated by Teck Coal, with plans for extensive expansion.

Much of the mines' waste rock contains high concentrations of selenium—an element that can kill embryos of fish and aquatic insects. Rain and snow falling on the waste rock stockpiles leaches selenium into the river system and then to Lake Koocanusa. When scientists with the Montana Department of Environmental Quality (DEQ) discovered elevated selenium concentrations in the lake in the mid-2000s, the issue escalated to the governor's office and Washington, D.C.

The combination of negative press and political pressure persuaded Teck Coal to meet with representatives from the United States and British Columbia to create a plan in which the company will self-regulate harmful selenium deposits by investing hundreds of millions of dollars in water treatment facilities.

"Unlike mercury, selenium is an essential mineral and can be metabolized by most living creatures," says Mike Hensler, FWP biologist in Libby. "If the environmental selenium is kept to a reasonable level, fish and other aquatic organisms should still be able to

The Kootenai River downstream

Libby Dam has been a mixed blessing for Kootenai River fisheries. The structure has moderated water flows, which before dam construction averaged 65,000 cubic feet per second (cfs) during spring runoff each year, then could drop to below 3,000 cfs in August. Now flows average 10,000 cfs during summer after a spring pulse of up to 25,000 cfs. The more stable flows, along with water temperatures kept cooler in summer and warmer in winter with strategic dam releases, have helped boost trout numbers between the dam and Kootenai Falls, 50 miles downstream.

Yet the hydropower structure also traps phosphorus and nitrogen in Lake Koocanusa, thus depriving aquatic life below the dam of much-needed nutrients. A study found that 63 percent of the phosphorus and 25 percent of the nitrogen that enters the reservoir binds with sediment and becomes trapped behind the dam. "Keep in mind that even before the dam, the Kootenai River was in a part of the state that geologically made the river far less productive than, say, the Bighorn or the Madison," says Jim Dunnigan, FWP fisheries biologist in Libby. "So that nutrient loss downstream is significant."

The biggest concern is how the dam affects federally endangered white sturgeon. White sturgeon are prehistoric fish that historically migrated to and from the Pacific Ocean. The fish in Montana's portion of the Kootenai became landlocked about 10,000 years ago when retreating glaciers in British Columbia created Bonnington Falls. As the region was settled by Europeans, clear-cutting and mining polluted rivers with silt, heavy metals, and toxins that killed aquatic insects that sturgeon eat. Dikes that drained bottomlands for farming and housing eliminated many river wetlands where young sturgeon previously hid and grew. The slow-growing species was also aggressively harvested for meat.

Making matters worse was construction of Libby Dam. The structure seems to have hampered the species' reproductive success downstream, though biologists are not sure why. "All we know for certain is that after they spawn, either the eggs or larvae aren't surviving," says Mike Hensler, FWP fisheries biologist in Libby. "We haven't given up on the white sturgeon, but the picture certainly isn't rosy."

Another issue that may affect the Kootenai's fisheries is the abnormal spread of *Didymosphenia geminata*, known as Didymo or rock snot. For reasons that remain unclear, the native algae has been growing into large mats that absorb already low amounts of phosphorus in the system, depressing growth of the algae that aquatic insects eat (they don't like Didymo). FWP and the U.S. Army Corps of Engineers are studying factors that might contribute to the prolific blooms of Didymo below Libby Dam and searching for methods to control the algae species. FWP biologists are also studying how the ecological disruption caused by Didymo might affect rainbow trout growth and survival.

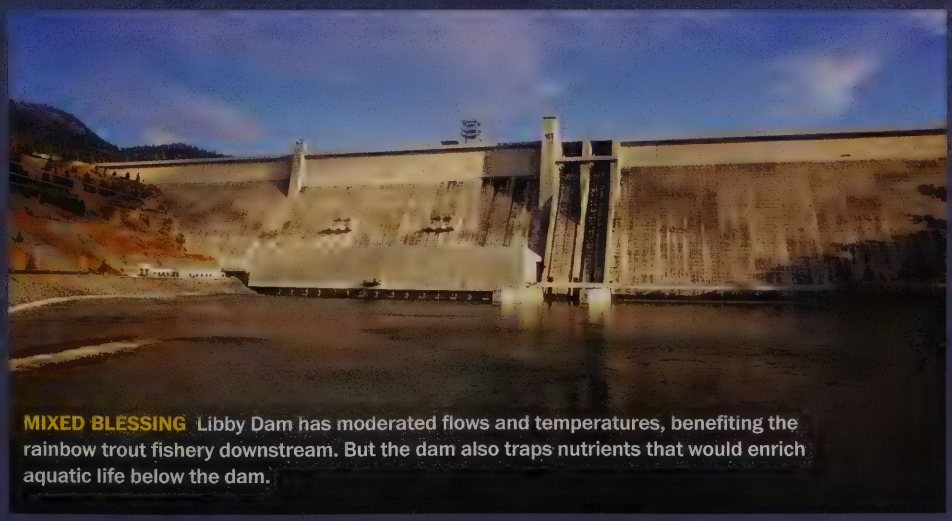
Though nitrogen and phosphorus levels in the Kootenai downstream from Libby Dam are low, the river has received an unexpected nutrient bonus in the form of kokanee salmon. In the late 1980s and early 1990s, fisheries managers for Koocanusa and the Kootenai River saw an overall jump in the average size of rainbow and bull trout. It turns out that oil-rich kokanee are like double bacon cheeseburgers to big trout. Below the dam, trout feed on the small salmon that come through the turbines. That calorie-rich food source grew the massive rainbow that was caught in 1997 by Jack Housel, Jr. The 33.1-pound monster, Montana's state record rainbow, has drawn attention to the tailrace fishery ever since. Local guides and FWP biologists say that the 3-mile stretch below the dam does contain big fish—dozens over 28 inches are caught each year—but they've yet to see anything that would put Housel, Jr.'s record at risk. Anglers catch the big trout deep in the river channel with lures, or with streamers on sinking fly line.

Farther downstream from the dam, the Kootenai's bread-and-butter trout are 12- to 14-inch rainbows, which one guide describes as "solid muscle and shaped like a fist." The fish are known to punch far above their weight class, with a 13-incher peeling off line like an 18-incher in other rivers. Throughout the Kootenai, anglers also occasionally catch westslope cutthroat averaging about 15 inches.

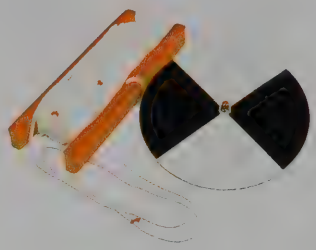
Fish size and density on the relatively infertile Kootenai are low compared to those on Montana's other big trout rivers. Yet far fewer anglers compete for trout on the Kootenai. Even during peak season, the river seems remote, with drift boats few and far between. Add to that the timbered mountains rising above both banks, and the crystal clear Kootenai can at times feel like a remote wilderness river. The occasional bull trout that anglers catch (but must release) adds to the river's backcountry ambiance. ■

thrive in Lake Koocanusa. But that's a big 'if.'"

A 2014 report by researchers from Wake Forest University concluded that further increases in selenium contamination would likely cause the Elk River's valuable cutthroat trout population to collapse. "On this side of the border, we're concerned about the effects [of selenium] on fish species in Koocanusa," says Jim Dunnigan, FWP fisheries biologist in Libby. Biologists with both DEQ and FWP continue to monitor selenium levels in fish from both Lake Koocanusa and the Kootenai River. Though state water quality guidelines in Koocanusa's Montana portion have not been exceeded, selenium levels have increased in recent years. ■



MIXED BLESSING Libby Dam has moderated flows and temperatures, benefiting the rainbow trout fishery downstream. But the dam also traps nutrients that would enrich aquatic life below the dam.



ALL EYES ON THE WATER

Volunteer lake monitors keep close watch on northwestern Montana lakes. What are they finding? By Becky Lomax

QUALITY CHECK Whitefish Lake Institute environmental scientist Josh Gubits and a volunteer collect water samples on Beaver Lake near Whitefish. Roughly 50 volunteers donate their time to monitor water quality on 41 northwestern Montana lakes.

Just as southwestern Montanans boast of their beautiful trout rivers, so do northwestern residents take pride in their sparkling blue lakes. The clear water, clean beaches, plentiful fish, and thrilling cry of loons on lakes like Whitefish, Swan, and Flathead draw wildlife watchers, anglers, boaters, and people looking for lakeshore vacation homes.

Essential to each lake's value is the quality of its water. No one wants to emerge from a swim covered in algae or boat through mats of floating vegetation.

Keeping the region's lakes clean and clear requires constant vigilance. Water can be degraded by old or faulty residential or community septic systems, agricultural runoff, erosion from poor land-use practices, or aquatic invasive species such as zebra mussels and Eurasian watermilfoil. "If we can identify a threat early enough, there's a good chance it can be solved before becoming a huge problem," says Josh Gubits, an environmental scientist with the Whitefish Lake Institute, a nonprofit organization that conducts research and develops programs that benefit Whitefish and other local lakes.

State and federal agencies lack funding and staff to monitor water quality on all Montana lakes. Fortunately, dozens of volunteers with the Northwest Montana Lakes Volunteer Monitoring Network donate their time on 41 regional waters. Gubits oversees the program, a partnership of the institute, Montana Fish, Wildlife & Parks, the Flathead Basin Commission, and the Flathead Lake Biological Station. "The program gives citizens a great opportunity to participate in the ecological future of the places where they live," he says.

The volunteers—lakeshore residents, college students, paddlers, and others—help keep local lakes healthy. Just as important, many say the hours spent closely observing the water also deepens a personal relationship with their beloved lakes and fosters a stronger sense of environmental stewardship.

The Whitefish Lake Institute isn't the only organization enlisting water quality volunteers. Montana State University, University of Montana, Salish Kootenai College, and other organizations run programs in which student volunteers from grade school to graduate school collect lake, stream, and river water samples and analyze the contents.

STRONGER ATTACHMENT

Much of the volunteer work on Montana's northwestern lakes is technical. Gubits teaches the roughly 50 volunteers how to

BECKY LOMAX

operate monitoring equipment, record data, identify and sample for aquatic invasive species, and take precautions to prevent introducing invasive species when traveling from one lake to another. Participants perform their duties on assigned lakes across Flathead, Lincoln, Lake, and Missoula Counties every two weeks from April through November.

Terry Divoky lives near West Glacier on Halfmoon Lake, which she began monitoring in 1993. "The personal connection is huge. Monitoring gave me a stronger attachment to the lake and self-satisfaction in knowing it so well," she says.

Divoky canoes, kayaks, or rows to her monitoring site, where, over the years, she has observed the lake's changing personality. She has watched birch trees on a nearby point die of old age and disease, and seen common loons replace the red-necked grebes that once nested and raised their young on the lake. In some years, heavy spring rains wash excess nutrients into Halfmoon, contributing to algae blooms that she documents.

As part of their commitment to lake stewardship, Divoky and most of her neighbors have replaced their lakeside lawns with at least a 25-foot-wide swath of native vegetation that protects the shoreline and improves water quality. "The lake's water is as clear, clean, and free of contaminants and aquatic invasive species as it was when I first moved here," Divoky says.

She and other lake volunteers monitor the water's color, odor, and contents such as sediments and algae. They also note weather conditions, water temperature, and anything else that could indicate changing water quality.

Water clarity is monitored using a Secchi disk, an 8-inch-diameter flat metal circle, divided into white and black quarters and attached to a cord. A volunteer lowers the

disk, used worldwide to measure water transparency, into the lake and records the depth at which the black and white quarters become indistinguishable from each other. By tracking the "Secchi depth" over time, scientists and local communities can identify trends such as more nutrient loading or algae production that help identify sources of lake contamination.

The keen-eyed volunteers can also be the first to notice the appearance of aquatic invasive species (AIS) such as Eurasian watermilfoil, zebra or quagga mussels, New Zealand mudsnails, and flowering rush. If they spot what looks like an AIS, volunteers report the GPS coordinates and a brief physical description to Gubits, who then conducts follow-up monitoring with FWP and Montana Department of Agriculture officials. "We also give volunteers PVC pipe sections to serve as artificial substrates," Gubits adds. "They place the pipes in fixed underwater locations and regularly check for colonization by invasive mussels."

> "The more I connect with 'my' lake, the more it feels like it's a part of me."

Steph Paidas of Whitefish joined the program in 2013 after buying a kayak. She tagged along with a friend who monitored nearby Murray Lake and then "inherited" the lake's monitoring duties when her friend moved away. "The more I connect with 'my' lake, the more it feels like it's a part of me," she says. Even though it's not part of her monitoring duties, Paidas also picks up trash along the shoreline. "Murray Lake has become my place, and I feel protective of it," she says.

In addition to reports from volunteers, Gubits conducts more-detailed surveys of all 41 lakes twice each year, once in summer and again in fall. Because so much movement among lakes could spread hidden aquatic invasive species, Gubits thoroughly inspects, washes, and dries his boat, motor, and monitoring equipment between each visit. "Educating the public about the importance of decontaminating watercraft and equipment is part of our goal," he says.

Volunteers often help Gubits take water samples that are then mailed to a laboratory for analysis of phosphorus, nitrogen, and chlorophyll. Plankton samples are analyzed for microscopic larvae of invasive zebra or quagga mussels. Gubits also lowers into the water a narrow, 2-foot-long cylindrical device called a Hydrolab that measures and records temperature, dissolved oxygen, and acidity.

SEVERAL USES

The data gathered by Gubits and the volunteers is used in several ways. One is to track water quality trends over long periods of time. A steady increase in phosphorus and nitrogen over the years could indicate leaking septic systems or the presence of human-introduced fertilizer or detergents. Another use of the monitoring information is to alert public agencies of recent changes in aquatic environments that could affect fishing, swimming, or drinking water. "That's why these folks are so valuable," says John Wachsmuth, an FWP conservation specialist closely involved in the volunteer program and AIS management in northwestern Montana. "You need a regular monitoring program to detect things that affect clean water and healthy habitat, because those are key to maintaining healthy fish populations."

For instance, says Wachsmuth, lakes with high calcium and alkalinity are more susceptible to mussel infestations. "Knowing which lakes are most susceptible to invasive species infestations helps us make better use of our time and funding," he says.

Yet another value of lake monitoring is to detect AIS and begin containment. When Eurasian watermilfoil was first detected in Beaver Lake in 2011 by a state employee, the discovery came early enough to combat the infestation. Soon after, an AIS task force representing state agencies, county weed districts, nonprofits, and consultants was formed. Bottom barrier mats and dredging got rid of most of the plants. The lake continues to be monitored for any reappearances. "If we detect invasives like Eurasian watermilfoil early enough, the likelihood of controlling them increases substantially," says Wachsmuth. "The quicker we find out about something like AIS, the quicker we can respond. And that's one reason why this volunteer program is so critical."

To volunteer with the Northwest Montana Lakes Volunteer Monitoring Network, visit nwmtlvmn.org.

KEEPING IT CLEAN Below: Students take water quality samples for a lake and stream monitoring workshop. Opposite page, top: A volunteer measures water clarity by lowering a Secchi disk into Halfmoon Lake near West Glacier. Bottom: Clean water is essential for a wide range of fish and wildlife, including bull trout, cutthroat trout, and common loons.

CLOCKWISE FROM RIGHT: BECKY LOMAX; CHUCK HANEY; BETHANN GARRAMON MERKLE; BETHANN GARRAMON MERKLE

Longtime Montana Outdoors *contributor Becky Lomax lives in Whitefish.*

The last thing birds need

by Bruce Auchly

While trimming a ponderosa pine in the front yard the other day, I looked up and there, slightly above eye level, was a nestling robin, its mouth open, expecting a meal.

Since I had only a small saw in my hand, the bird stayed hungry. Its behavior, however, caught my attention.

Perhaps a week old or more, the nestling spied me and knew something was amiss. First it froze, mouth agape. Then, when I looked away, the tiny bird sunk into the nest. Disappeared.

Young birds are everywhere now. Some still in nests, others learning to fly, and many not surviving.

A young bird's life is fraught with danger. Many eggs are laid but few survive to become birds and fly away. Of birds hatched in nests on or above ground, like meadowlarks and robins, about half survive to learn to fly, when the bird is about two weeks old. Think of that: If a robin lays four eggs, only two will survive the approximately 28 days from egg to hatching to nestling to flying.

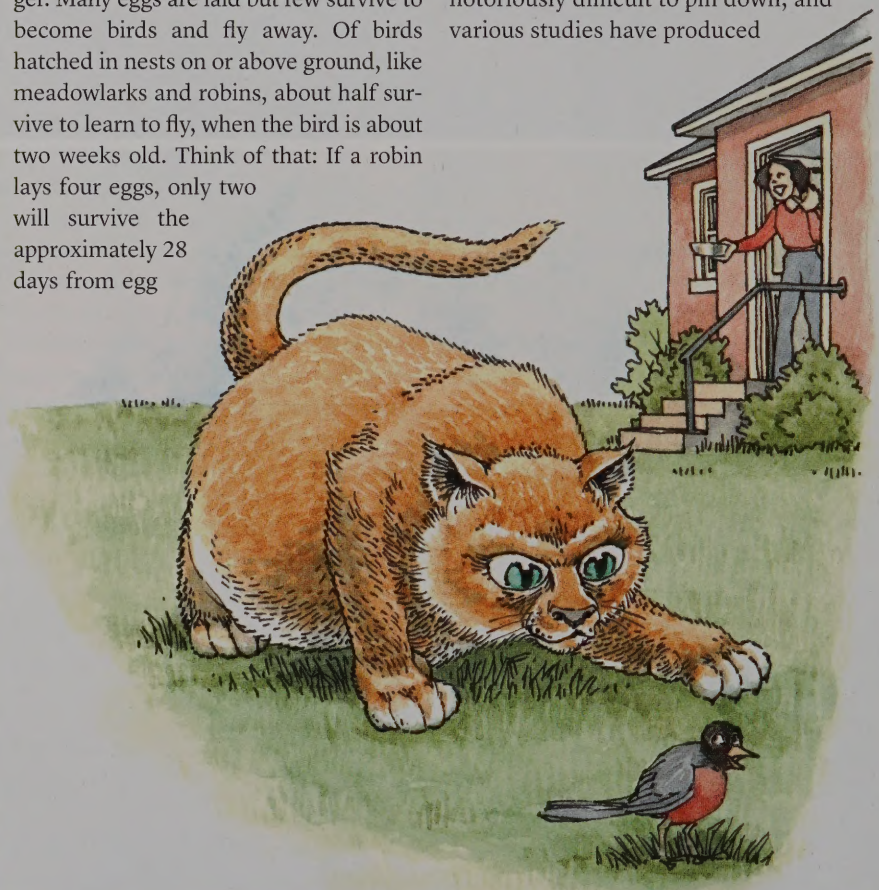
For cavity-nesting birds such as bluebirds, the success rate is better, with about two-thirds living to fledge.

Even after surviving the nest and flying away, most small birds, such as chickadees and goldfinches, don't live more than six months to maybe two years.

Medium birds, like robins, can live four to ten years or more. Canada geese and other big birds can live for 20 years. Generally, the larger the bird, the longer it lives.

It's that first year that takes the greatest toll on birds. Accidents, disease, migration, and winter starvation all do a number on birds. Then there's Boots, the house cat.

House cat predation on songbirds is notoriously difficult to pin down, and various studies have produced differing figures. Yet most studies agree that in the United States each year, house cats kill millions, perhaps tens of millions of birds. Because house cats are well fed and kill just for sport, one biologist calls them "subsidized predators."



If overfed house cats just eliminated English sparrows and starlings, no one would complain. They don't, of course. Those tubby tabbies also kill warblers and robins and bluebirds.

Predation plays an important role in nature. One study determined that if a single pair of robins successfully raised two broods of four young each year, and all their descendants survived to reproduce, the result over ten years would be about 19 million robins. That would be intolerable.

So we can't condemn predation. But there's natural predation and then there's house cat predation.

Fortunately, cats don't always win. Several years ago, I watched a killdeer mother lure our house cat around for what seemed like weeks, putting on a crippled-bird act. During the performance her killdeer chick froze and the cat never saw it.

Cats have their place. As anyone who has lived in the country or an old house will tell you, cats are death on mice, and that's a good thing.

But they also take their share of birds, joining the myriad other obstacles a young bird must survive to live another day.

If you have a cat, keep it indoors. Or if you let it out, keep a watchful eye.

Life's hard enough for birds without our pets out there stalking them for sport. Though I guess you could say the same thing about me and elk. Talk about a "subsidized predator."

Bruce Auchly manages the FWP regional Information and Education Program in Great Falls.

ILLUSTRATION BY E. B. JENNE

NATHAN COOPER

Channel catfish

Ictalurus punctatus

By Tom Dickson

Scientific name
Ictalurus is Greek for "fish cat," and *punctatus* is Latin for "spotted," in reference to the many dark spots on the body of younger fish.

After easing the powerful fish into the river shallows following a 15-minute tussle, I stopped for a moment to admire its elegant shape and delicate coloring. Fly rod tucked under one arm, I gently lifted the sleek channel catfish, my palm against its belly to avoid the fish's three sharp spines. After plucking the black Woolly Bugger from its mouth, I released the fish back into the Musselshell River for another angler to catch.

Channel catfish are not what comes to mind when most people think of Montana fly-fishing, but these native game fish will take a wet fly if presented properly. Otherwise, try some fermented cow liver.

Identification

Montana is home to four members of the catfish family, but only the channel cat and tiny stonecat are native. Black and yellow bullheads are introduced species. Though all four have barbels, adipose fins (like on trout), and flat heads, the channel catfish is usually much larger. It can easily be distinguished from bullheads by its deeply forked tail. That appendage, along with the fish's torpedo-like shape, account for its power when hooked.

The channel catfish has a smooth, scaleless skin that runs gray to light olive on the back and sides, which are speckled with small dark spots.

Like all members of the catfish family, channel cats have two pairs of "whiskers," or barbels. The barbels are covered with tiny taste buds that the fish uses to find food. Contrary to popular belief, barbels don't sting. But catfish can inflict pain. When alarmed, they erect their sharp dorsal and pectoral spines perpendicular to their body, and anglers occasionally stab themselves when mishandling the fish. The spines don't contain venom, but they are covered in mucus that can quickly infect a wound. The spine tips dull with age, so the bigger the catfish, the less careful you need to be when handling it.

Stay-at-home dads

The male channel catfish creates a nest by cleaning debris and silt from an undercut bank, hollow log, or other underwater cavity. After the female lays her eggs there, the male takes over and guards the eggs and newly hatched fry, attacking any intruders.

Range

Channel catfish are found in the lower Musselshell, Milk, lower Missouri, and lower Yellowstone Rivers and their tributaries, as well as Nelson, Tongue River, and Fort Peck Reservoirs. They thrive in warmer waters and tolerate turbid conditions.

Size

The species can reach nearly 35 pounds in Montana, though the average caught by anglers is closer to 2 to 5 pounds. Montana's state record, a 34.8-pound, 41¾-inch-long behemoth, was caught in 2013 by an angler fishing Fort Peck Reservoir.

Diet

Channel catfish are opportunistic feeders that consume minnows, insects, crayfish, mollusks, and vegetation such as seeds.

Angling

Channel catfish behave like a warmwater version of brown trout. They spend midday in deep riffles and at the head and tail of pools. At dusk and into the night they move to shallow, rocky flats and riffles to feed. Winter sends them to deep holes.

Anglers catch channel catfish on lures and streamers but mainly with bait. The fish feed in dark, muddy waters by smelling food with their whiskers. Anglers use chunks of cheese; fermented cow livers; fresh-cut goldeye, suckers, or chubs; or live minnows, frogs, or waterdogs. Anglers should check the Montana fishing regulations for restrictions on live bait, which, when released illegally, can harm fisheries.

Recognition

The biggest fans of this species are members of the Montana Catfish Association, which was established in 2006. The organization sponsors several fishing tournaments, including the Milk River Catfish Classic, which attracts roughly 80 two-person teams who vie for a $1,000 first-place award.

Tom Dickson is editor of Montana Outdoors.

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PARTING SHOT

SPINNER FALL Spent Trico spinners (sexually mature adults) cover the water surface after mating in middair earlier in the morning. See page 14 for advice on how to imitate these tiny bugs and successfully deliver your fly to a trout's mouth. Photo by John Juracek.

Montana Fish, Wildlife & Parks

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